

REMARKS

This communication is submitted in response to the Office Action dated July 1, 2005.

Claims 1-45 are pending in the subject patent application with claims 1, 2, 5, 6, 8, 11, 12, 15, 16, 20, 21, 23, 30, 32 and 33 being amended herewith and claims 41-45 being newly presented herewith. Claims 3, 4, 7, 9, 10, 13, 14, 17-19, 22, 24-29, 31 and 34-40 have not been changed relative to their immediate prior version.

The amended and newly presented claims are clearly supported by the specification as originally filed and do not introduce any new matter.

The specification has been amended for consistency with the claims. The amendments to the specification are clearly supported by the specification as originally filed and do not introduce any new matter.

Reconsideration of the subject application is respectfully requested in view of the foregoing amendments and the following remarks.

Claims 2, 3, 5, 12, 15-19, 23-25 and 32 were objected to by the Examiner as being dependent upon a rejected base claim but were indicated as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. Claims 2, 5, 12, 15, 16, 23 and 32 have each been amended to be rewritten in independent form to include all of the limitations of the base claim and any intervening claims. Independent claims 2, 5, 12, 15, 16, 23 and 32 should now be allowable along with their dependent claims 3, 17, 18, 19, 24 and 25.

The rejection of claims 1, 11, 13, 30 and 31 as being anticipated by Hill, the rejection of claims 9 and 14 as being unpatentable over Hill, and the rejection of claims

1, 4, 6-11, 20-22, 26-29 and 33-40 as being unpatentable over Kawamata are all respectfully traversed for the following reasons.

Independent claim 1 requires a combination of features not disclosed or suggested by Hill. Independent claim 1 requires the plug body to be rotatably disposed in a die orifice, each of the plurality of grooves in the plug body to terminate at a forward groove end and at a rearward groove end on the plug body, each of the plurality of lands in the plug body to terminate at a forward land end and at a rearward land end on the plug body, the grooves to closely correspond to internal helical ribs formed in tubing drawn longitudinally over and relative to the plug body in a forward direction through the die orifice as the plug body rotates within the die orifice and the tubing, and each pair of flank surfaces of the grooves to include a forward flank surface facing in opposition to the forward direction of draw for the tubing over the plug body and extending angularly outwardly from the root surface at an angle, and a rearward flank surface facing toward the forward direction of draw for the tubing over the plug body and extending angularly outwardly from the root surface at an angle less steep than the angle of the forward flank surface.

Independent claim 1 cannot be anticipated by Hill since Hill fails to disclose any of the aforementioned features. Hill does not disclose, first of all, a plug body to be rotatably disposed in a die orifice. Rather, Hill discloses that the grooved mandrel 12 and the tube 10 disposed therein are drawn together as an assembly longitudinally through a die 14 in the direction indicated by the arrow 15 in Fig. 1 (column 2, lines 24-28). It follows that Hill does not and cannot disclose the additional feature recited in claim 1 of grooves closely corresponding to internal helical ribs formed in tubing drawn

longitudinally over and relative to the plug body as the plug body rotates within the tube and the die, since Hill does not disclose the tube 10 being drawn longitudinally over and relative to the mandrel 12 and does not disclose the mandrel 12 rotating within the tube 10 or die 14. On the contrary, Hill discloses that the entire assembly of the tube 10 and the mandrel 12 is drawn longitudinally through the die 14. Hill also discloses the mandrel 12 as having a single continuous helical groove 16 and a single continuous land surface 21 as opposed to a plurality of grooves and a plurality of lands as recited in independent claim 1. Notably, Hill refers to both the helical groove 16 and the land surface 21 in the singular. Hill thusly does not and cannot disclose the features recited in claim 1 where each of a plurality of grooves terminates at a forward groove end and at a rearward groove end on the plug body and each of a plurality of lands terminates at a forward land end and a rearward land end on the plug body. Because Hill discloses the mandrel 12 drawn longitudinally through the die 14 together with the tube 10, the features recited in claim 1 pertaining to the forward and rearward flank surfaces of the grooves cannot be found in Hill. Hill does not and has no reason to recognize any relationship between the flank surfaces 18 and 20, much less the steepness of their angles, with respect to a longitudinal direction of draw of tubing over and relative the mandrel 12 because Hill does not disclose that the tube 10 is even drawn longitudinally over and relative to the mandrel 12. The purpose explicitly stated in Hill of providing the flank surfaces 18 and 20 with different angles is to produce axial and radial clearances to permit separation of the tube 10 from the mandrel 12 after the assembly of tube 10 and mandrel 12 is drawn through the die 14. In Hill, the tube 10 is in such tight engagement with the mandrel 12 after being drawn together through the die 14 that the

clearances between the tube and the mandrel must be adjusted via a reeling operation in order to allow the mandrel 12 to be removed from the tube 10. The profile for groove 16 is selected by Hill so that an increase in radial clearance between the tube 10 and mandrel 12 effected by the reeling operation is accompanied by an increase in axial clearance between the tube 10 and the mandrel 12. This is completely unrelated to the claimed invention, wherein separation of the plug body from the tubing is not an issue since the tubing is drawn longitudinally over and relative to the plug body as the plug body rotates within the tubing and the die orifice. Hill thusly provides no teachings relevant to the steepness of the angles for the flank surfaces 18 and 20 in relation to the direction of draw for tubing drawn longitudinally over and relative to the mandrel, there being no direction of draw for the tube 10 of Hill longitudinally over and relative to the mandrel 12. Accordingly, independent claim 1 cannot be anticipated by Hill and is submitted to be clearly patentable over Hill along with its dependent claims 4, 6-10, 41 and 42.

Independent claim 1 stands rejected in the alternative as being unpatentable over Kawamata. The essence of Kawamata is a grooved plug 4 where each groove reduces in width from the inlet side to the outlet side of tube 2 drawn between the plug 4 and a die 1 in order to form projections of sufficient height in the inner surface of the tube. The Examiner's rejection is based on Fig. 3 of Kawamata; however, Fig. 3 of Kawamata does not provide support for the conclusion reached by the Examiner except with use of impermissible hindsight made possible only from the teachings of the claimed invention. First of all, it is not clear from Fig. 3 that Kawamata is disclosing forward and rearward flank surfaces of a groove having angles of different steepness.

The angles disclosed in Fig. 3 of Kawamata for the surfaces that the Examiner equates with flank surfaces appear to be virtually identical and would be considered identical by a viewer without the teachings of the present invention in mind. Even if Fig. 3 of Kawamata is considered as disclosing flank surfaces of different steepness, it does not disclose or suggest a rearward flank surface facing toward the forward direction of draw for the tube 2 and extending at an angle from a root surface less steep than the angle of a forward flank surface facing in opposition to the direction of draw for the tube. Indeed, Fig. 3 of Kawamata appears to derive from Fig. 2, in which case the flank surfaces are neutral with neither facing toward or in opposition to the direction of draw for tube 2. Kawamata, therefore, does not disclose or suggest the features recited in claim 1 pertaining to the steepness of the angles of the forward and rearward flank surfaces of the grooves in relation to the forward direction of draw of the tubing, and Kawamata does not provide any motivation for adopting the features of the claimed invention. Accordingly, it is submitted that independent claim 1 is clearly patentable over Kawamata and should be allowed along with its dependent claims 4 and 6-10 which also stand rejected as being unpatentable over Kawamata.

Independent claim 11 recites the plug body to be rotatably disposed in a die orifice, a plurality of external grooves and a plurality of external lands, each of the plurality of grooves in the plug body to terminate at a forward groove end and at a rearward groove end on the plug body, each of the plurality of lands in the plug body to terminate at a forward land end and at a rearward land end on the plug body, and the grooves to closely correspond to internal helical ribs formed in tubing being drawn longitudinally over and relative to the plug body in a forward direction through the die

orifice as the plug body rotates within the die orifice and the tubing. As discussed above in connection with independent claim 1, Hill does not disclose any of these features. Independent claim 11 further requires that the root surface of each groove have a width in cross-section normal to the groove defined between first and second radii, that a rearward one of the flank surfaces of the groove be angularly offset from the first radii at a first angle in the cross-section in a direction opposed to the forward direction of draw for the tubing over the plug body, and that a forward one of the flank surfaces be angularly offset from the second radii at a second angle, smaller than the first angle, in the cross-section in a direction toward the forward direction of draw for the tubing over the plug body. It is noted that Hill discloses the groove 16 in profile along a longitudinal section of the mandrel but not in cross-section normal to the groove. In addition, as pointed out above in connection with independent claim 1, Hill fails to teach or suggest any relationship between the steepness of the angles for the flank surfaces 18 and 20 with respect to the direction of draw for tubing drawn over and relative to the mandrel 12, much less a relationship between the angular offset of the flank surfaces from first and second radii in cross-section normal to the groove with respect to the direction of draw for tubing over the mandrel. Accordingly, independent claim 11 cannot be anticipated by Hill and is submitted to be clearly patentable over Hill along with its dependent claims 13, 14 and 43.

With regard to the rejection of claim 11 as being unpatentable over Kawamata, Fig. 3 of Kawamata provides no basis from which to conclude that it represents a cross-section normal to a groove. As pointed out above in the discussion for independent claim 1, Fig. 3 of Kawamata also provides no basis from which it can be concluded that

the grooves have forward and rearward flank surfaces at different angles or any relationship between the flank surfaces and the forward direction of draw for tube 2. It follows that Kawamata in Fig. 3 does not disclose or suggest a rearward flank surface angularly offset from a first radii at a first angle in a cross-section normal to the groove in a direction opposed to the direction of draw for tubing over the plug and a forward flank surface angularly offset from a second radii at a second angle, smaller than the first angle, in the cross-section normal to the groove in a direction toward the forward direction of draw for tubing over the plug. It is submitted, therefore, that independent claim 11 is clearly patentable over Kawamata and should be allowed along with dependent claims 13, 14 and 43.

Independent claim 20 requires the grooves to correspond to internal helical ribs formed in tubing drawn longitudinally over and relative to the plug body from a rearward end of the plug body toward a forward end of the plug body, each of the grooves to have an asymmetrical cross-section normal to the groove defined by a rearward flank surface extending angularly outwardly from the root surface at a first radial angle toward the rearward end of the plug body and a forward flank surface extending angularly outwardly from the root surface at a second radial angle, less than the first radial angle, and in a direction opposite the rearward flank surface, and a connector coupling the plug body to the shaft for rotation of the shaft as one with the plug body when the plug body rotates within the die orifice and the tubing. As discussed above, Fig. 3 of Kawamata would not be interpreted as depicting a groove having an asymmetrical cross-section in the absence of hindsight made possible from the teachings of the claimed invention. Even if Fig. 3 of Kawamata is viewed as illustrating a groove having

an asymmetrical cross-section, its depiction does not disclose a rearward flank surface extending from a root surface at a first radial angle toward the rearward end of the plug body and a forward flank surface extending from the root surface at a second radial angle, less than the first radial angle, in a direction opposite the rearward flank surface.

Fig. 3 of Kawamata fails to establish any relationship between the angle for a rearward flank surface and the rearward end of the plug body. In addition to failing to disclose the features recited in claim 20 relating to the forward and rearward flank surfaces of the grooves, Kawamata fails to disclose a connector for coupling the plug 4 to the forward end of shaft 3 for rotation of the shaft as one with the plug 4. The Examiner points to Fig. 4 of Kawamata for the features of a shaft and connector as recited in claim 20. However, Fig. 4 of Kawamata fails to provide any disclosure whatsoever that the connector 5 couples plug 4 to the shaft 3 for rotation of the shaft 3 as one with the plug 4. Accordingly, it is submitted that independent claim 20 cannot be considered obvious over Kawamata and that independent claim 20 should be allowed along with its dependent claims 21, 22, 26-29 and 44.

Independent claim 30 recites the plug body to be rotatably disposed in a die orifice, to have a plurality of external grooves and a plurality of external lands, and the grooves to closely corresponding to internal helical ribs formed in tubing being drawn longitudinally over and relative to the plug body in a forward direction through the die orifice as the plug body rotates within the die orifice and the tubing. None of the latter features are disclosed by Hill as already pointed out above. The plug body recited in claim 30 is also required to be constrained against longitudinal movement in the drawing die and, in contrast, Hill discloses that the mandrel 12 is moved longitudinally

through the drawing die along with tube 10. Claim 30 further recites that each pair of flank surfaces of the grooves comprises a rearward flank surface angled from the root surface in a direction opposed to the forward direction of draw for the tubing over the plug body and a forward flank surface angled from the root surface toward the forward direction of draw for the tubing over the plug body, the forward flank surfaces being steeper than the rearward flank surfaces. As explained above, Hill fails to recognize any relationship whatsoever between the angle of the flank surfaces 18 and 20 and a forward direction of longitudinal draw for tubing over and relative to the mandrel in that the tube 10 is not drawn longitudinally over and relative to the mandrel 12 of Hill but, rather, the tube and mandrel of Hill are drawn together through the die. Independent claim 30 thusly cannot be anticipated by Hill and is submitted to be patentable over Hill along with dependent claims 31 and 45.

Independent claim 33 relates to a method where the steps of drawing a length of tubing longitudinally in a forward direction over the plug body requires the plug body to be longitudinally constrained and each groove in the plug body to have forward and rearward flank surfaces extending from a root surface at different radial angles in opposite directions from one another wherein the radial angle of the forward flank surfaces extend toward the forward direction of draw for the tubing over the plug body and is less than the radial angle of the rearward flank surfaces such that the forward flank surfaces are steeper than the rearward flank surfaces. Independent claim 33 stands rejected as being unpatentable over Kawamata. However, as explained above, Fig. 3 of Kawamata fails to establish that each groove in the plug has forward and rearward flank surfaces extending from a root surface at different radial angles in

opposite directions. Even if Fig. 3 of Kawamata can be considered as disclosing flank surfaces of different angles, it does not disclose a forward flank surface with a radial angle extending toward the forward direction of draw for tubing over the plug and which is less than the radial angle of a rearward flank surface such that the forward flank surfaces are steeper than the rearward flank surfaces. Kawamata cannot be interpreted as recognizing any relationship between the angle of the flank surfaces and the forward direction of draw for tubing over the plug body in the absence of impermissible hindsight made possible only from the teachings of the claimed invention. Accordingly, independent claim 33 is submitted to be clearly patentable over Kawamata and should be allowed along with its dependent claims 34-40.


Dependent claims 34-40 are asserted to be obvious over Kawamata. The rejection of dependent claims 34-40 is submitted to be improper because the Examiner has failed to produce any evidence whatsoever to show that the steps recited therein would be obvious to one of ordinary skill in the art. In particular, the Examiner has failed to produce any evidence in support of the obviousness of the step of annealing recited in claim 34, the steps of heat treating, straightening and cutting recited in claim 35, the steps of subjecting the tubing to wet preparation and removing points and tails recited in claim 36, the steps of applying corrosion protection, tapping, bundling, documenting, labeling, storing and shipping recited in claim 37, the steps of chemically descaling, passivating, soaping and drying recited in claim 38, the step of applying sulphuric acid recited in claim 39, and the step of applying a phosphate solution recited in claim 40.

Newly presented claim 41 depends from independent claim 1 and recites that

the plug body is caused to rotate within the die orifice and the tubing in response to the tubing being drawn longitudinally over the plug body, and claim 41 is submitted to be allowable with independent claim 1 as well as being patentable for the limitations recited therein. Dependent claims 42-45 depend, respectively, from independent claims 1, 11, 20 and 30 and have been presented in order to clarify the fact that the angles for the rearward and forward flank surfaces do not need to be exactly 37° and 16°, respectively, in accordance with a scope of protection to which applicant is entitled based on support provided in the specification as originally filed. Claims 42-45 are submitted to be allowable with their respective independent claims as well as being patentable for the additional limitations recited therein.

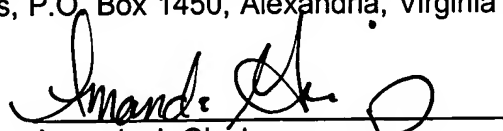
In light of the foregoing, all of the claims in the subject application are submitted to be in condition for allowance. Action in conformance therewith is courteously solicited. Should any issues in the subject patent application remain unresolved, the Examiner is encouraged to contact the undersigned attorney.

Respectfully submitted,


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